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ABSTRACT

Since prospective teachers' personal beliefs and attitudes about teaching is of increasing interest to teacher educators, this study investigated changes in preservice teachers' beliefs about the relevance of a required course in educational measurement and testing and their confidence in performing the skills taught in the class. The sample consisted of 118 upper-division undergraduates enrolled in a course in testing and measurement for teachers during the spring semester, 1994. The Academic Motivation Profile (AMP) was used to obtain students' perceptions of their level of confidence. Students completed the AMP five times during the semester. Descriptive statistics, including means, standard deviations, and internal consistency reliability indices were used to provide an overview of the findings. Prior to and throughout instruction, preservice teachers' beliefs about the relevance of a course in classroom measurement were positively related to their sense of confidence in performing measurement-related tasks. Furthermore, as instruction progressed, the magnitude of this relationship increased. Prospective teachers who doubted their skill level also questioned the relevance of instruction. Prior to and throughout instruction, participants believed that the course was relevant to their needs as teachers though their perceptions of course relevance decreased as instruction progressed. (Contains 22 references and 5 tables.) (JB)

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Preservice Teachers' Beliefs about the Relevance of Teacher Education Coursework and Their Confidence in Performing Related Skills

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Of increasing interest to teacher educators is prospective teachers' personal beliefs and attitudes about teaching. In a review of research on professional growth among preservice and beginning teachers, Kagan (1992) concluded that teacher education candidates have pre-existing beliefs about classrooms, pupils, and images of themselves as teachers. Candidates use these beliefs and images to filter the content of education course work, confirming rather than confronting and correcting their pre-existing beliefs. Furthermore, their views and images remain relatively stable and unchanged during the preservice continuum. Thus, novice teachers enter the classroom with an "idealized view of pupils and an optimistic, oversimplified picture of classroom practice" that leaves them unprepared for the realities of teaching (p. 154). Examining and understanding preservice teachers' beliefs and attitudes should provide useful and important insight for educators whose task it is to prepare future classroom teachers.

Of interest in this study is preservice teachers' beliefs about the relevance of instruction and their confidence in performing related tasks. Prospective teachers often have high levels of confidence in their teaching ability (Brookhart & Freeman, 1992; Kalaian & Freeman, 1987; Pigge & Marso, 1987; Weinstein, 1988; Weinstein, 1989). Weinstein (1989) refers to prospective teacher's beliefs about their teaching ability as "unrealistic optimism" and cautions that "students who hold unrealistic expectations about their own success may devalue the need for professional preparation", thus experiencing dismay when they actually enter the classroom as teachers (p. 59). The purpose of this study was to extend previous research (Kushner, Carey, Dedrick, & Wallace, 1994) that investigated changes in preservice teachers beliefs about the relevance of a required course in educational measurement and testing and their confidence in performing the skills taught in the class.

Academic Motivation Theory

Keller (1979) identified confidence and relevance as two factors in academic motivation. Theoretically, achievement is enhanced when the skills and tasks learned are perceived to be relevant to the student's personal needs, and the student feels reasonably confident that he or she will be successful in performing new skills. The perceived relevance of learning tasks effects personal aspirations, performance expectations, and effort allocations (Weinert & Kluwe, 1987). Likewise, students who experience continued failure with a task become frustrated and withdraw, as do students who are overconfident and exhibit boredom (Sternberg, 1986). Thus, the relationship between prospective teachers' perceptions of their skill level and their perceptions of the relevance of teacher education coursework, is of interest. It may be that prospective teachers who are overly confident in their teaching abilities, also question the relevance of their teacher education curriculum for job-related teaching tasks.

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Teacher Beliefs About Testing and Measurement

While it is estimated that teachers spend from 15 to 40 percent of their classroom time in testing and assessment-related activities (Gullickson, 1984; Stiggins, 1988; Wise, Lukin, & Roos, 1992) and that beginning teachers rank grading, testing, and assessing students as one of their greatest concerns (Evans & Tribble, 1986; Schafer & Lissitz, 1987; Veenman, 1984), there is limited current research on the attitudes and beliefs of inservce teachers about measurement training, and almost no research on preservice teachers.

Gullickson (1984) surveyed 450 elementary and secondary teachers about their attitudes and beliefs about classroom testing practices. While teachers perceived themselves as having an adequate knowledge of testing, they also reported that they learned how to test through on-the-job experience rather than formal training. Gullickson concluded that teachers may be overly confident in their testing skills. In a later study, Gullickson and Ellwein (1985) reported a discrepancy between teachers' beliefs about the importance of measurement practices and their self-reported classroom practices. Subsequently, Gullickson found a difference between professors' and inservice teachers' beliefs about the relevance of measurement topics in preservice educational measurement courses. Impara, Plake, and Fager (1993) survey 555 teachers from 82 school systems in 42 states. The authors reported that most teachers have positive attitudes about the importance of classroom assessment. In a study of 397 classroom teachers, Wise, Lukin, and Roos (1992) found that the majority of teachers rated their measurement skills highly even though many of them felt that their measurement training was inadequate. The authors attributed this apparent inconsistency to several factors. For one, many preservice and practicing teachers receive a subtle message that formal measurement training is unimportant to teaching. Furthermore, teachers may believe that their measurement skills are strong. In the absence of corrective feedback, teachers use these faulty beliefs to define their skill level. Finally, while teachers believe they need better measurement skills, they may also believe that the available formal coursework is irrelevant to their needs. Wilk (1992) concluded that prospective teachers have only a vague notion about the purpose and content of a course in educational measurement. Their beliefs about their measurement skills are likely to be based on their own test-taking experiences, and their expectations about the course are often colored by the "word-of-mouth" reputation passed along by fellow students.

Measurement and Analysis of Change

The analysis of change has been a central and controversial issue in educational research (Collins & Horn, 1991; Cronbach & Furby, 1970; Harris, 1963). Traditionally, many researchers have attempted to describe and explain individual change using two-wave designs in which the focus has been on raw change scores or residualized change scores that have been adjusted for initial status. Willett (1989) and others (Bryk & Raudenbush, 1987; Rogosa, 1987; Rogosa, Brandt, & Zimowski, 1982; Rogosa & Willet, 1985) have criticized these approaches as being inadequate in "conceptualization, measurement, and design" (Bryk & Raudenbush, 1992, p. 130) and they have suggested a more powerful framework for the analysis of change. The framework incorporates the statistical theory of hierarchical linear model (HLM) and involves using at least 3 data points to model individual growth in an attribute over time (Bryk & Raudenbush, 1987, 1992). Using a multi-wave design increases the precision of the measurement of individual change.

In the HLM framework, individual change is represented in a two-stage model encompassing both within- and between-subjects factors. In the first stage each individual's status on the outcome measure is plotted over time and a growth "curve" or line is fit to the data. This growth trajectory, which may be linear or nonlinear, best describes how each individual is changing. In the second stage of analysis, the individual parameters from the first stage are tested to determine if there is variability between subjects. If there is variability in how people are changing then the next step becomes trying to understand what factors (such as gender, age, or initial status) explain the inter-individual differences.

To extend the research in the area of growth curve analysis, HLM was used in this study to describe and explain changes in preservice teachers' levels of confidence in performing measurement related skills and their perceptions of course relevance as they progressed through the course.

Research Questions

1. Prior to during instruction, what is the relationship between preservice teachers' perceptions of the relevance of a required course in educational measurement and their level of confidence measurement skills?

2. How do preservice teachers' ratings of course relevance and personal confidence in performing skills change throughout the course of instruction?

3. What factors (teaching major, internship experience, achievement level etc.) might account for differences in preservice teachers' ratings of relevance and confidence?

Method

Sample. The sample consisted of 118 upper-division undergraduates enrolled in a course in testing and measurement for teachers during the spring semester, 1994. The sample consisted of 55 elementary majors, 14 secondary majors, 43 special education majors, 4 students from performance areas such as art, music, drama, and physical education, and 2 students from other areas. Nearly three-quarters of the students had completed 16-30 semester hours of education coursework yet, the participants' classroom experiences were varied. Approximately half of the participants reported that they had spent a semester or less observing in a classroom, one-third had planned lessons and taught under supervision, and the remaining students reported that they had major responsibility for conducting a class. Additional demographic information was collected to determine what factors might explain differences in ratings of confidence and course relevance. A complete profile of the preservice teachers is presented in Table 1. The profile represents 117 students as one student elected not complete the demographic information.

Instrument. The Academic Motivation Profile (AMP) developed by Carey (1990) was used to obtain student's perception of their level of confidence. Based on Keller's (1979) model of academic motivation for instructional design, the AMP contains 36 items, has four factors (attention, relevance, confidence, and satisfaction) and includes nine items within each factor. While students were instructed to complete all 36 items of the AMP, only the confidence and relevance factors were examined in this study. Participants rated their confidence in designing and developing assessment measures, assessing student performance, and communicating student progress. They rated the relevance of the course during college, during their transition to teaching, and as a future teacher. In previous studies, the AMP demonstrated sound psychometric characteristics (Carey, Carey, & Pearson, 1992; Carey, Dedrick, Carey, & Kushner, 1994).

Procedure. Students completed the AMP five times during the semester. The initial administration took place on the first day of the semester prior to instruction, and subsequent administrations took place following four unit examinations, at approximately four week intervals throughout the semester. Students identified themselves on the rating form to enable linking their responses with their achievement scores.

Data Analysis. Descriptive statistics, including means, standard deviations, and internal consistency reliability indices were used to provide an overview of the findings. Hierarchical linear modeling using the HLM computer program (Bryk, Raudenbush, Seltzer, & Congdon, 1988) was used to examine both individual change in confidence and relevance, as well as factors such as teaching major and achievement level that may explain between-individual differences.

Results

Descriptive Statistics. Table 2 presents the mean scores, standard deviations, and internal consistency reliability coefficients for the five administrations of the confidence and relevance factor of the AMP. Ratings of confidence fluctuated somewhat during the course of instruction, although initial and final mean confidence scores and variability were fairly similar. Initially, students had high expectations for the relevancy of the course. As instruction progressed the mean relevance scores decreased and group variability increased, indicating that students were less sure of the relevance of the course for their future needs. Still, students' responses indicated that they felt the course was moderately to very relevant. The relationship between students' self-ratings of confidence and relevance was statistically significant and positive on all but the second administration of the AMP (Day 1, $r=.22$; Week 8, $r=.38$; Week 11, $r=.37$; Week 15, $r=.61$).

Within- and between-individual growth models. In the first stage of the HLM analysis, the five sets of confidence and relevance scores were plotted for each individual and simple linear models were fit to the data using Ordinary Least Squares regression. A within-subjects model was estimated and the results are summarized in Table 3. The mean growth rates showed no significant change in confidence ratings and a significant, but small, decrease in perceptions of relevance.

In the second stage of the HLM analysis, the variation in students' growth curves was explored using the demographic variables identified in Table 1 and students' academic achievement in the course, as measured by their final course grade. The results of the within-subjects models are reported in Tables 4 and 5. The preservice teachers in this study from performance areas such as music, physical education, art, and drama, reported lower initial ratings of confidence than other teaching areas. Students who had spent more time observing and participating in classroom experiences had higher initial ratings of confidence. For both groups, however, their pattern of change in confidence did not differ from other groups of students. Students enrolled for more semester hours and higher achieving students showed an increase in confidence as instruction progressed, although their initial ratings of confidence were no different than other groups of students. Initially, preservice teachers who were employed for more hours expected the course to be less relevant than other groups of students. As instruction progressed, this group of students showed a less steep decline in their perceptions of course relevance than other groups, as did higher achieving students.

Discussion

Prior to and throughout instruction, preservice teachers' beliefs about the relevance of a course in classroom measurement were positively related to their sense of confidence in performing measurement-related tasks. Furthermore, as instruction progressed, the magnitude of this relationship increased. Prospective teachers who doubted their skill level also questioned the relevance of instruction. In contrast, those teacher candidates who felt more confident in their abilities also believed that the course was more relevant. The positive relationship between confidence and relevance was found in a previous study conducted by the authors (Kushner, Carey, Dedrick, & Wallace, 1994). The concern that preservice teachers who were overly confident might also question the relevance of instruction appears to be unsubstantiated.

Prior to and throughout instruction, the participants in this study believed that the course was quite relevant to their needs as classroom teachers, although their perceptions of course relevance decreased as instruction progressed. Previously, the authors found that prospective teachers reported high initial perceptions of course relevance and their perceptions remained stable as instruction progressed. Given that prospective teachers often have vague or misinformed ideas about classroom measurement practices, one might have expected that teacher candidates would question the relevance of the course. It may be that prospective teachers' concerns about grading, testing, and evaluating their students aroused and sustained a high level of interest in the course.

Consistent with academic motivation theory, it would appear that academic achievement helped to explain the differences in prospective teachers attitudes and beliefs about the course. Those students who reported increased levels of confidence and less of a decrease in relevance were more successful academically than their classmates. Differences in growth patterns attributed to the number of semester hours enrolled and the number of hours employed may not be interpretable due to subject attrition and incomplete data. These factors are particularly problematic in longitudinal studies in which the researcher must consider systematic reasons for subject and data loss. In this study, 312 students completed the AMP on the first day of class. Shortly after the semester began, nine students dropped the course. Of the remaining 303 students, over half had incomplete sets of responses on the AMP. That is, complete responses to the AMP were not available for the five sets of confidence and relevance scores - a requisite for the HLM analysis. One might contend that collecting five sets of data throughout the semester was too frequent; however, the AMP takes a relatively short period of time to complete. To determine if differences were present between those students with complete sets of data and those with incomplete sets of data, t-tests were conducted. There were no significant differences between the groups on achievement, and confidence and relevance scores. Furthermore, there were no significant differences between the groups on all demographic variables except for enrollment and work loads. Although it would appear that there was no systematic differences between those preservice teachers with complete data and those without, differences between confidence and relevance based on work load and employment load should be interpreted with caution.

Whether the high levels of self-confidence reported by the preservice teachers in this study are, in fact, "unrealistic optimism", is yet to be determined. In subsequent studies, additional data points should be established to understand how perceptions of course relevance and confidence change during the transition from preservice to inservice teaching. Results from such a study might help to determine what impact preservice teachers' perceptions of confidence and instructional relevance have on their professional experiences and expectations. Furthermore, an understanding of the multi-faceted nature of preservice teacher belief systems may assist teacher educators as they prepare teacher candidates to face the realities of the classroom.

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Table 1
Profile of Preservice Teachers (n=117)

What is your major area of study?

Elementary Education	46.6%
Secondary Education	11.9%
Special Education	36.4%
Performance Areas	3.4%
Other	.8%

How many semester hours of education courses have you completed so far?

0-6 hours	8.5%
7-15 hours	22.9%
16-30 hours	52.5%
31-45 hours	5.1%
46 or more hours	10.2%

Which experience best describes your experiences in the classroom thus far?

I have not observed in a classroom.	28.8%
I have observed for one semester.	20.3%
I have observed for two semesters.	.8%
I have observed, planned lessons, and taught under supervision.	36.4%
I have had major responsibility for conducting a class.	12.7%

How many semester hours are you taking this term?

3 hours	1.7%
4-6 hours	4.2%
7-9 hours	1.7%
10-15 hours	50.0%
16 or more	41.5%

During this semester, how many hours do you plan to be employed (work for wages) each week?

None	22.0%
1-10 hours	16.9%
11-20 hours	27.1%
21-30 hours	17.8%
31 hours or more	15.3%

How long have you wanted to be a teacher?

I am not sure I want to be a teacher.	5.1%
Since last summer.	2.5%
For about a year.	21.2%
Since I graduated from high school.	27.1%
Since before I graduated from high school.	43.2%

How long do you plan to be a teacher?

I do not plan to be teacher.	4.2%
Until I get accepted into graduate school.	5.9%
Until I get through graduate school.	8.5%
For at least 10 years.	16.9%
I plan a career as a teacher.	63.8%

Which of the following statements best describes your feeling about your achievement in mathematics related subjects?

I have difficulty understanding math-related concepts and processes.	0%
I generally understand math but I am nervous about math-related courses.	36.4%
Math-related courses are about the same to me as other courses.	13.6%
I do well in math-related courses.	22.9%
I do well in math-related courses, and I enjoy them more than other courses.	12.7%

Which of the following statements best describes your prior experience with computers?

I have no prior computer experience.	5.9%
I have only used them to play games.	.8%
I have only used computers for word-processing.	51.7%
I have completed a computer class in college and have examined several educational programs.	20.3%
I am a regular computer user and am familiar with a variety of computer applications.	19.5%

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Table 2
Descriptive Statistics for Confidence and Relevance Factor of AMP

	Mean	SD	Alpha
Confidence			
Day 1	3.18	.77	.93
Week 4	3.00	.65	.90
Week 8	3.06	.67	.92
Week 11	3.19	.63	.92
Week 15	3.24	.64	.96
Relevance			
Day 1	3.63	.47	.82
Week 4	3.50	.50	.81
Week 8	3.26	.61	.82
Week 11	3.37	.59	.88
Week 15	3.26	.70	.92

Table 3
Hierarchical Linear Model for Within-Individual Change in Confidence and Relevance

Predictor	Coefficient	SE	p-level
Confidence			
Intercept	3.061	.059	.000
Slope	.008	.005	.097
Relevance			
Intercept	3.580	.040	.000
Slope	-0.024	.005	.000

Table 4
Hierarchical Linear Models for Between-Individual Change in Level of Confidence

Predictor	Coefficient	SE	p-level
Intercept	3.838	1.076	.001
Elementary	-1.384	.660	.101
Secondary	- .826	.662	.213
Special Ed.	- .930	.647	.151
Performance	-1.525	.713	.032
Hours Completed	.047	.065	.476
Experience	.106	.049	.029
Hours Enrolled	- .058	.084	.490
Hours Employed	.047	.047	.318
Teaching Aspirations	- .043	.058	.460
Career	- .040	.059	.494
Math Attitudes	.084	.050	.098
Computer Experience	.053	.059	.365
Achievement	- .002	.008	.769
Slope	- .235	.093	.012
Elementary	- .006	.057	.932
Secondary	.008	.057	.892
Special Ed.	.009	.056	.869
Performance	.026	.062	.671
Hours Completed	- .001	.006	.834
Experience	- .000	.004	.892
Hours Enrolled	- .015	.007	.046
Hours Employed	- .003	.004	.524
Teaching Aspirations	.002	.005	.667
Career	.006	.005	.216
Math Attitudes	.000	.004	.843
Computer Experience	.007	.005	.182
Achievement	.002	.000	.013

Table 5
Hierarchical Linear Models for Between-Individual Change in Level of Relevance

Predictor	Coefficient	SE	p-level
Intercept	3.634	.689	.000
Elementary	.579	.423	.171
Secondary	.512	.424	.228
Special Ed.	.724	.414	.080
Performance	- .015	.456	.974
Hours Completed	- .024	.041	.559
Experience	.028	.031	.365
Hours Enrolled	.015	.054	.778
Hours Employed	- .069	.030	.022
Teaching Aspirations	.070	.037	.058
Career	- .030	.038	.429
Math Attitudes	.027	.032	.410
Computer Experience	- .031	.038	.414
Achievement	- .008	.005	.089
Slope	- .369	.085	.000
Elementary	- .071	.052	.174
Secondary	.100	.052	.055
Special Ed.	.080	.051	.112
Performance	.109	.056	.051
Hours Completed	.005	.005	.371
Experience	.000	.004	.881
Hours Enrolled	.012	.007	.076
Hours Employed	.008	.004	.036
Teaching Aspirations	- .003	.005	.450
Career	.003	.005	.463
Math Attitudes	.003	.004	.471
Computer Experience	.007	.006	.123
Achievement	.002	.000	.002